

## CDx4HC4511, CD74HCT4511 BCD-to-7 Segment Latch/Decoder/Drivers

### 1 Features

- 2-V to 6-V  $V_{CC}$  operation ('HC4511)
- 4.5-V to 5.5-V  $V_{CC}$  operation (CD74HCT4511)
- High-output sourcing capability
  - 7.5 mA at 4.5 V (CD74HCT4511)
  - 10 mA at 6 V ('HC4511)
- Input latches for BCD code storage
- Lamp test and blanking capability
- Balanced propagation delays and transition times
- Significant power reduction compared to LSTTL logic IC's
- 'HC4511
  - High noise immunity,  $N_{IL}$  or  $N_{IH} = 30\%$  of  $V_{CC}$  at  $V_{CC} = 5$  V
- CD74HCT4511
  - Direct LSTTL input logic compatibility,  $V_{IL} = 0.8$  V Maximum,  $V_{IH} = 2$  V minimum
  - CMOS input compatibility,  $I_I \leq 1\mu\text{A}$  at  $V_{OL}$ ,  $V_{OH}$

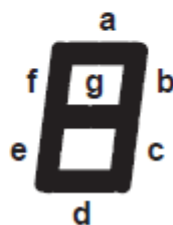
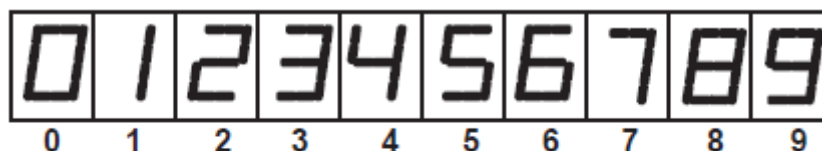
### 2 Description

The CD54HC4511, CD74HC4511, and CD74HCT4511 are BCD-to-7 segment latch/decoder/drivers with four address inputs ( $D_0$ – $D_3$ ), an active-low blanking ( $\overline{BL}$ ) input, lamp-test ( $\overline{LT}$ ) input, and a latch-enable ( $\overline{LE}$ ) input that, when high, enables the latches to store the BCD inputs. When  $\overline{LE}$  is low, the latches are disabled, making the outputs transparent to the BCD inputs.

#### Device Information

PART NUMBER	PACKAGE <sup>(1)</sup>	BODY SIZE (NOM)
CD54HC4511	J (CDIP, 16)	24.38 mm × 6.92 mm
CD74HC4511	N (PDIP, 16)	19.31 mm × 6.35 mm
	D (SOIC, 16)	9.90 mm × 3.90 mm
	PW (TSSOP, 16)	5.00 mm × 4.40 mm
CD74HCT4511	N (PDIP, 16)	19.31 mm × 6.35 mm

(1) For all available packages, see the orderable addendum at the end of the data sheet.



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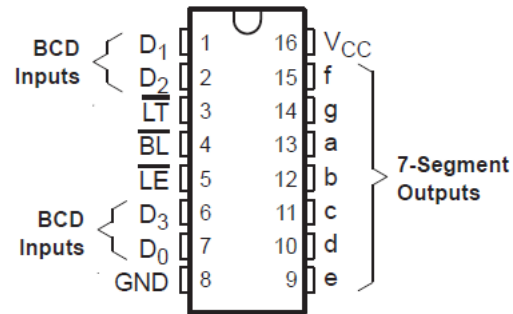
### 3 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

#### Changes from Revision D (October 2003) to Revision E (August 2022) Page

- Updated the numbering, formatting, tables, figures, and cross-references throughout the document to reflect modern data sheet standards..... 1

## 4 Pin Configuration and Functions



**J, N, D, PW package**  
**16-Pin CDIP, PDIP, SOIC, TSSOP**  
**Top View**

## 5 Specifications

### 5.1 Absolute Maximum Ratings

over operating free-air temperature (unless otherwise noted)<sup>(1)</sup>

		MIN	MAX	UNIT
V <sub>CC</sub>	Supply voltage	- 0.5	7	V
I <sub>IK</sub>	Input diode current	V <sub>I</sub> < - 0.5 V or V <sub>I</sub> > V <sub>CC</sub> + 0.5 V <sup>(1)</sup>		±20 mA
I <sub>OK</sub>	Output diode current	V <sub>O</sub> < - 0.5 V or V <sub>O</sub> > V <sub>CC</sub> + 0.5 V <sup>(1)</sup>		±20 mA
I <sub>O</sub>	Output source or sink current per output pin	V <sub>O</sub> = 0 to V <sub>CC</sub>		±25 mA
Continuous current through V <sub>CC</sub> or GND				±50 mA
T <sub>J</sub>	Junction temperature			150 °C
T <sub>stg</sub>	Storage temperature range	- 65	150	°C
Lead temperature (During Soldering)		At distance 1/16 ± 1/32 in (1.59 ± 0.79 mm) from case for 10 s maximum		265 °C
		Unit inserted into a PC board (minimum thickness 1/16 in, 1.59 mm) (with solder contacting lead tips only)		300 °C

- (1) Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability

### 5.2 Recommended Operating Conditions for 'HC4511<sup>(1)</sup>

		T <sub>A</sub> = 25°C		T <sub>A</sub> = - 55°C to 125°C		T <sub>A</sub> = - 40°C to 85°C		UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V <sub>CC</sub>	Supply voltage	2	6	2	6	2	6	V
V <sub>IH</sub>	High-level input voltage	V <sub>CC</sub> = 2 V		1.5		1.5		V
		V <sub>CC</sub> = 4.5 V		3.15		3.15		
		V <sub>CC</sub> = 6 V		4.2		4.2		
V <sub>IL</sub>	Low-level input voltage	V <sub>CC</sub> = 2 V		0.5		0.5		V
		V <sub>CC</sub> = 4.5 V		1.35		1.35		
		V <sub>CC</sub> = 6 V		1.8		1.8		
V <sub>I</sub>	Input voltage	0	V <sub>CC</sub>	0	V <sub>CC</sub>	0	V <sub>CC</sub>	V
V <sub>O</sub>	Output voltage	0	V <sub>CC</sub>	0	V <sub>CC</sub>	0	V <sub>CC</sub>	V
t <sub>t</sub>	Input transition rise/fall time	V <sub>CC</sub> = 2 V		1000		1000		ns
		V <sub>CC</sub> = 4.5 V		500		500		
		V <sub>CC</sub> = 6 V		400		400		

- (1) All unused inputs of the device must be held at V<sub>CC</sub> or GND to ensure proper device operation. Refer to the TI application report Implications of Slow or Floating SMOS Inputs, literature number SCBA004.

### 5.3 Recommended Operating Conditions for CD74HCT4511<sup>(1)</sup>

		T <sub>A</sub> = - 55°C to 125°C		T <sub>A</sub> = - 55°C to 125°C		T <sub>A</sub> = - 40°C to 85°C		UNIT
		MIN	MAX	MIN	MAX	MIN	MAX	
V <sub>CC</sub>	Supply Voltage	4.5	5.5	4.5	5.5	4.5	5.5	V
V <sub>IH</sub>	High-level input voltage	2		2		2		V
V <sub>IL</sub>	Low-level input voltage	0.8		0.8		0.8		
V <sub>I</sub>	Input voltage	V <sub>CC</sub>		V <sub>CC</sub>		V <sub>CC</sub>		V
V <sub>O</sub>	Output voltage	V <sub>CC</sub>		V <sub>CC</sub>		V <sub>CC</sub>		V

### 5.3 Recommended Operating Conditions for CD74HCT4511<sup>(1)</sup> (continued)

		T <sub>A</sub> = – 55°C to 125°C		T <sub>A</sub> = – 55°C to 125°C		T <sub>A</sub> = – 40°C to 85°C		UNIT
		MIN	MAX	MIN	MAX	MIN	MAX	
t <sub>t</sub>	Input transition (rise and fall) time	500		500		500		ns

- (1) All unused inputs of the device must be held at V<sub>CC</sub> or GND to ensure proper device operation. Refer to the TI application report Implications of Slow or Floating SMOS Inputs, literature number [SCBA004](#).

### 5.4 Thermal Information

THERMAL METRIC <sup>(1)</sup>		D (SOIC)	N (PDIP)	PW (TSSOP)	UNIT
		16 PINS	16 PINS	16 PINS	
R <sub>θJA</sub>	Package thermal impedance	67	73	108	°C/W

- (1) For more information about traditional and new thermal metrics, see the [Semiconductor and IC package thermal metrics](#) application report.

### 5.5 'HC4511 Electrical Characteristics

over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST CONDITIONS	V <sub>CC</sub>	T <sub>A</sub> = 25°C		T <sub>A</sub> = – 55°C to 125°C		T <sub>A</sub> = – 40°C to 85°C		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	
V <sub>OH</sub> High level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> = –20 μA	2 V	1.9	1.9	1.9	V		
			4.5 V	4.4	4.4	4.4			
			6 V	5.9	5.9	5.9			
			I <sub>OH</sub> = –4 mA	4.5 V	3.98	3.7		3.84	
			I <sub>OH</sub> = –5.2 mA	6 V	5.48	5.2		5.34	
V <sub>OL</sub> Low level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OL</sub> = 20 μA	2 V	0.1	0.1	0.1	V		
			4.5 V	0.1	0.1	0.1			
			6 V	0.1	0.1	0.1			
			I <sub>OL</sub> = 4 mA	4.5 V	0.26	0.4		0.33	
			I <sub>OL</sub> = 5.2 mA	6 V	0.26	0.4		0.33	
I <sub>I</sub> Input leakage current V	V <sub>I</sub> = V <sub>CC</sub> or 0	6 V	±0.1		±1		±1	μA	
I <sub>CC</sub> Supply current	V <sub>I</sub> = V <sub>CC</sub> or 0, I <sub>O</sub> = 0	6 V	8		160		80	μA	
C <sub>i</sub> Input Capacitance		2 V to 6 V	10		10		10	pF	

### 5.6 CD74HCT4511 Electrical Characteristics

over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST CONDITIONS	V <sub>CC</sub>	T <sub>A</sub> = 25°C			T <sub>A</sub> = – 55°C to 125°C		T <sub>A</sub> = – 40°C to 85°C		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V <sub>OH</sub> High level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> = –20 μA	4.5 V	4.4		4.4	4.4		V	
				I <sub>OH</sub> = –4 mA	3.98		3.7	3.84		
V <sub>OL</sub> Low level output voltage	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OL</sub> = 20 μA	4.5 V		0.1		0.1		V	
				I <sub>OL</sub> = 4 mA		0.26		0.4		
I <sub>I</sub> Input leakage current V	V <sub>I</sub> = V <sub>CC</sub> to GND	5.5 V		±0.1			±1		μA	
I <sub>CC</sub> Supply current	V <sub>I</sub> = V <sub>CC</sub> or 0, I <sub>O</sub> = 0	5.5 V		8			160		80	μA
ΔI <sub>CC</sub> <sup>(1)</sup> Supply-Current Change	LT, LE inputs held at V <sub>CC</sub> – 2.1 V	4.5 V to 5.5 V	100	540		735		675		μA
	BL, Dn inputs held at V <sub>CC</sub> – 2.1 V		100	108		147		135		

## 5.6 CD74HCT4511 Electrical Characteristics (continued)

over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST CONDITIONS	V <sub>CC</sub>	T <sub>A</sub> = 25°C			T <sub>A</sub> = -55°C to 125°C		T <sub>A</sub> = -40°C to 85°C		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
C <sub>i</sub> Input Capacitance					10		10		10	pF

- (1) Additional supply current per input pin, TTL inputs high, 1 unit load. For dual-supply systems, theoretical worst-case (V<sub>I</sub> = 2.4 V, V<sub>CC</sub> = 5.5 V) specification is 1.8 mA.

## 5.7 'HC4511 Timing Requirements

	V <sub>CC</sub>	T <sub>A</sub> = 25°C		T <sub>A</sub> = -55°C to 125°C		T <sub>A</sub> = -40°C to 85°C		UNIT
		MIN	MAX	MIN	MAX	MIN	MAX	
t <sub>w</sub>	2 V	80		120		100		ns
	4.5 V	16		24		20		
	6 V	14		20		17		
t <sub>su</sub>	2 V	60		90		75		ns
	4.5 V	12		18		15		
	6 V	10		15		13		
t <sub>h</sub>	2 V	3		3		3		ns
	4.5 V	3		3		3		
	6 V	3		3		3		

## 5.8 Switching Characteristics

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	V <sub>CC</sub>	T <sub>A</sub> = 25°C			T <sub>A</sub> = -55°C TO 125°C		T <sub>A</sub> = -40°C TO 85°C		UNIT
					MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t <sub>pd</sub>	D <sub>n</sub>	Output	C <sub>L</sub> = 50 pF	2 V		300		450		375	ns	
				4.5 V		60		90		75		
			6 V		51		77		64			
			C <sub>L</sub> = 15 pF	5 V		25						
	LE	Output	C <sub>L</sub> = 50 pF	2 V		270		405		340		
				4.5 V		54		81		68		
			6 V		46		69		58			
			C <sub>L</sub> = 15 pF	5 V		23						
	BL	Output	C <sub>L</sub> = 50 pF	2 V		220		330		275		
				4.5 V		44		66		55		
			6 V		37		56		47			
			C <sub>L</sub> = 15 pF	5 V		18						
LT	Output	C <sub>L</sub> = 50 pF	2 V		160		240		200			
			4.5 V		32		48		40			
		6 V		27		41		34				
		C <sub>L</sub> = 15 pF	5 V		13							
t <sub>t</sub>	Any	C <sub>L</sub> = 50 pF	2 V		75		110		95			
			4.5 V		15		22		19			
			6 V		13		19		16			

## 5.9 CD74HCT4511 Timing Requirements

		T <sub>A</sub> = 25°C		T <sub>A</sub> = – 55°C TO 125°C		T <sub>A</sub> = – 40°C TO 85°C		UNIT
		MIN	MAX	MIN	MAX	MIN	MAX	
t <sub>w</sub>	Pulse duration, $\overline{LE}$ low	16		24		20		ns
t <sub>su</sub>	Setup time, BCD inputs before $\overline{LE}$ ↑	16		24		20		ns
t <sub>h</sub>	Hold time, BCD inputs before $\overline{LE}$ ↑	5		5		5		ns

over operating free-air temperature range (unless otherwise noted)

## 5.10 CD74HCT4511 Switching Characteristics

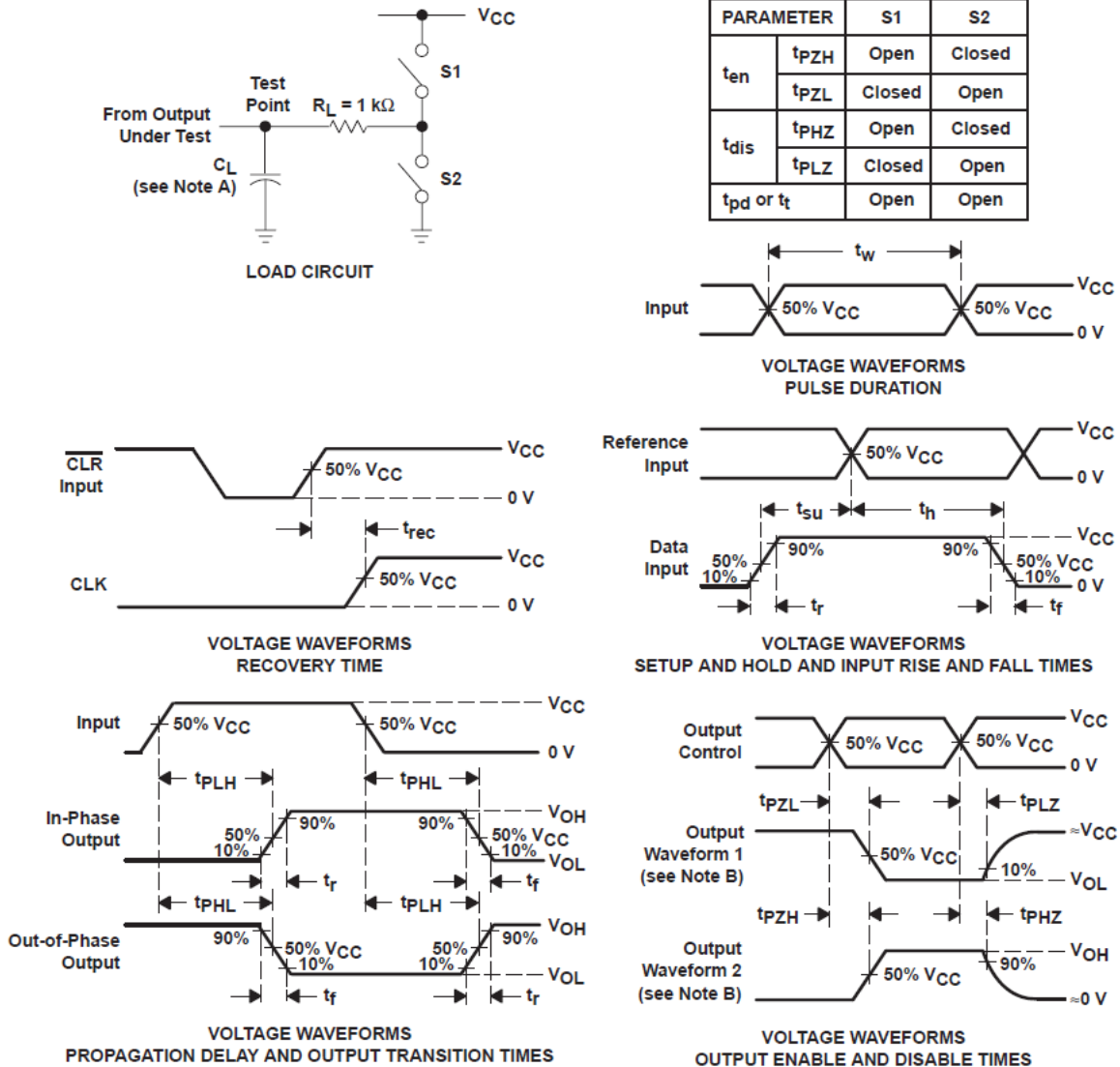
PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	V <sub>CC</sub>	T <sub>A</sub> = 25°C			T <sub>A</sub> = – 55°C to 125°C		T <sub>A</sub> = – 40°C to 85°C		UNIT
					MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t <sub>pd</sub>	D <sub>n</sub>	Output	C <sub>L</sub> = 50 pF	4.5 V			60		90		75	ns
			C <sub>L</sub> = 15 pF	5 V		25						
	$\overline{LE}$	Output	C <sub>L</sub> = 50 pF	4.5 V			54		81		68	
			C <sub>L</sub> = 15 pF	5 V		23						
	$\overline{BL}$	Output	C <sub>L</sub> = 50 pF	4.5 V			44		66		55	
			C <sub>L</sub> = 15 pF	5 V		18						
	$\overline{LT}$	Output	C <sub>L</sub> = 50 pF	4.5 V			33		50		41	
			C <sub>L</sub> = 15 pF	5 V		13						
t <sub>t</sub>		Any	C <sub>L</sub> = 50 pF	4.5 V			15		22		19	ns

## 5.11 Operating Characteristics

PARAMETER <sup>(1)</sup>			TYP	UNIT
C <sub>pd</sub>	Power dissipation capacitance	'HC4511	114	pF
		CD74HCT4511	110	

- (1) C<sub>pd</sub> is used to determine the dynamic power consumption, per package.  
 $P_D = C_{pd} V_{CC}^2 f_i + \sum C_L V_{CC}^2 f_o$  where:  
 f<sub>i</sub> = input frequency  
 f<sub>o</sub> = output frequency  
 C<sub>L</sub> = output load capacitance  
 V<sub>CC</sub> = supply voltage

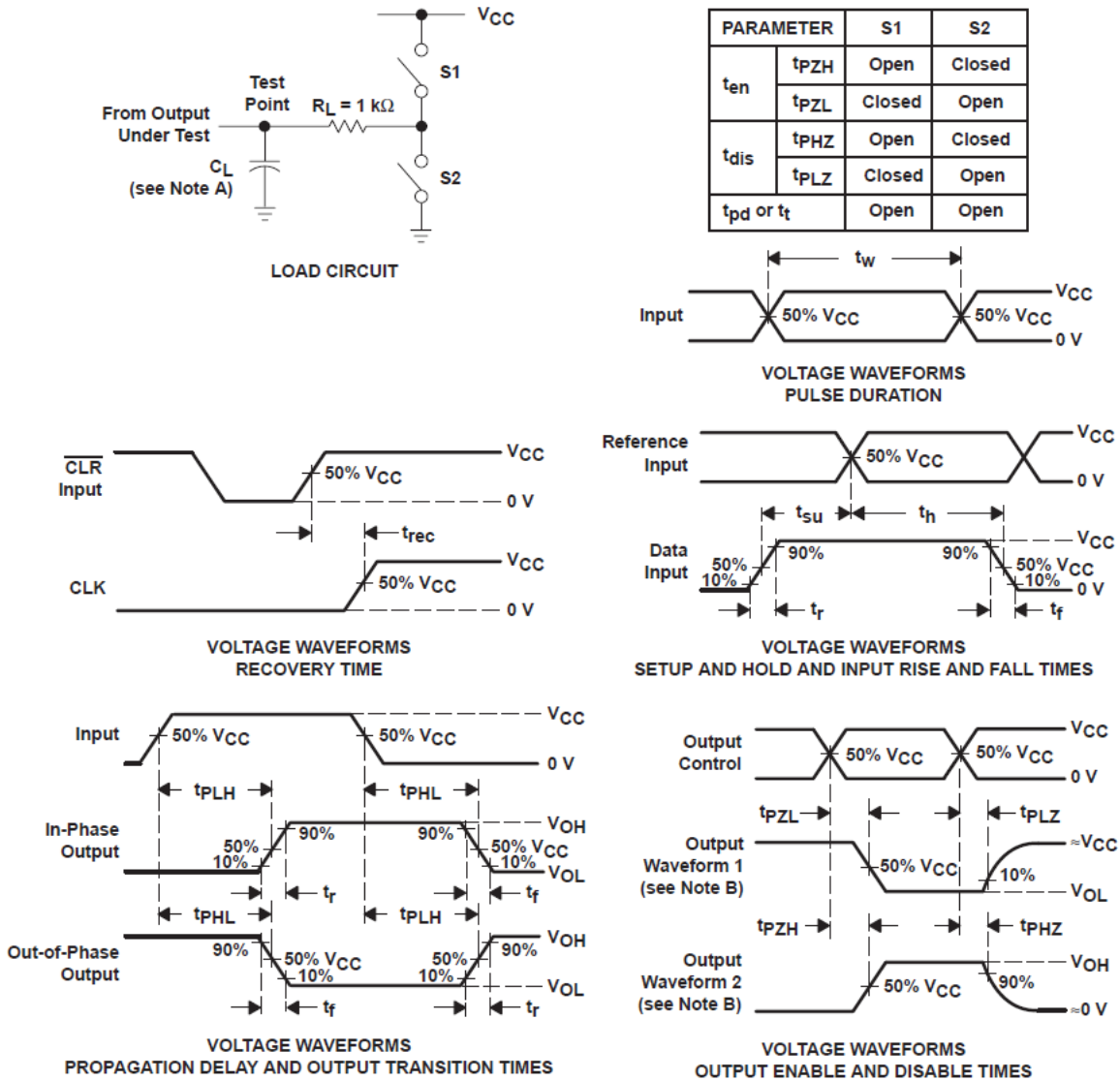
## 6 Parameter Measurement Information



- NOTES: A.  $C_L$  includes probe and test-fixture capacitance.  
 B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.  
 C. Phase relationships between waveforms were chosen arbitrarily. All input pulses are supplied by generators having the following characteristics:  $PRR \leq 1\text{ MHz}$ ,  $Z_O = 50\ \Omega$ ,  $t_r = 6\text{ ns}$ ,  $t_f = 6\text{ ns}$ .  
 D. For clock inputs,  $f_{max}$  is measured with the input duty cycle at 50%.  
 E. The outputs are measured one at a time with one input transition per measurement.  
 F.  $t_{PLZ}$  and  $t_{PHZ}$  are the same as  $t_{dis}$ .  
 G.  $t_{PZL}$  and  $t_{PZH}$  are the same as  $t_{en}$ .  
 H.  $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{pd}$ .

Figure 6-1. 'HC4511





- NOTES: A.  $C_L$  includes probe and test-fixture capacitance.  
 B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.  
 C. Phase relationships between waveforms were chosen arbitrarily. All input pulses are supplied by generators having the following characteristics:  $PRR \leq 1$  MHz,  $Z_O = 50 \Omega$ ,  $t_r = 6$  ns,  $t_f = 6$  ns.  
 D. For clock inputs,  $f_{max}$  is measured with the input duty cycle at 50%.  
 E. The outputs are measured one at a time with one input transition per measurement.  
 F.  $t_{pLZ}$  and  $t_{pHZ}$  are the same as  $t_{dis}$ .  
 G.  $t_{pZL}$  and  $t_{pZH}$  are the same as  $t_{en}$ .  
 H.  $t_{pLH}$  and  $t_{pHL}$  are the same as  $t_{pd}$ .

**Figure 6-2. CD74HCT4511**

## 7 Detailed Description

### 7.1 Overview

The CD54HC4511, CD74HC4511, and CD74HCT4511 are BCD-to-7 segment latch/decoder/drivers with four address inputs ( $D_0$ – $D_3$ ), an active-low blanking ( $\overline{BL}$ ) input, lamp-test ( $\overline{LT}$ ) input, and a latch-enable ( $\overline{LE}$ ) input that, when high, enables the latches to store the BCD inputs. When  $\overline{LE}$  is low, the latches are disabled, making the outputs transparent to the BCD inputs.

These devices have standard-size output transistors, but are capable of sourcing (at standard  $V_{OH}$  levels) up to 7.5 mA at 4.5 V. The HC types can supply up to 10 mA at 6 V.

### 7.2 Functional Block Diagram

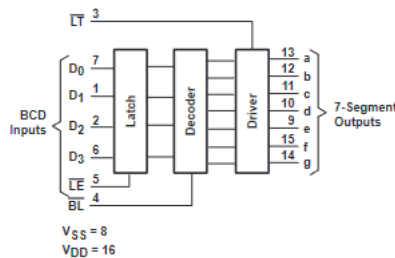


Figure 7-1. Function Diagram

### 7.3 Device Functional Modes

Table 7-1. Function Table

INPUTS <sup>(1)</sup>							OUTPUTS <sup>(2)</sup>							
$\overline{LE}$	$\overline{BL}$	$\overline{LT}$	$D_3$	$D_2$	$D_1$	$D_0$	a	b	c	d	e	f	g	DISPLAY
X	X	L	X	X	X	X	H	H	H	H	H	H	H	8
X	L	H	X	X	X	X	L	L	L	L	L	L	L	Blank
L	H	H	L	L	L	L	H	H	H	H	H	H	L	0
L	H	H	L	L	L	H	L	H	H	L	L	L	L	1
L	H	H	L	L	H	L	H	H	L	H	H	L	H	2
L	H	H	L	L	H	H	H	H	H	H	L	L	H	3
L	H	H	L	H	L	L	L	H	H	L	L	H	H	4
L	H	H	L	H	L	H	H	L	H	H	L	H	H	5
L	H	H	L	H	H	L	L	L	H	H	H	H	H	6
L	H	H	L	H	H	H	H	H	H	L	L	L	L	7
L	H	H	H	L	L	L	H	H	H	H	H	H	H	8
L	H	H	H	L	L	H	H	H	H	L	L	H	H	9
L	H	H	H	L	H	L	L	L	L	L	L	L	L	Blank
L	H	H	H	L	H	H	L	L	L	L	L	L	L	Blank
L	H	H	H	H	L	L	L	L	L	L	L	L	L	Blank
L	H	H	H	H	L	H	L	L	L	L	L	L	L	Blank
L	H	H	H	H	H	L	L	L	L	L	L	L	L	Blank
L	H	H	H	H	H	H	L	L	L	L	L	L	L	Blank
H	H	H	X	X	X	X	t	t	t	t	t	t	t	t

(1) H = High Voltage Level, L = Low Voltage Level, X = Don't care = Depends on BCD code previously applied when  $\overline{LE}$  = LNOE: Display is blank for all illegal input codes (BCD > HLLH).

(2) H = Driving High, L = Driving Low, Z = High Impedance State

## 8 Power Supply Recommendations

The power supply can be any voltage between the minimum and maximum supply voltage rating located in the *Recommended Operating Conditions*. Each  $V_{CC}$  terminal should have a good bypass capacitor to prevent power disturbance. A 0.1- $\mu\text{F}$  capacitor is recommended for this device. It is acceptable to parallel multiple bypass caps to reject different frequencies of noise. The 0.1- $\mu\text{F}$  and 1- $\mu\text{F}$  capacitors are commonly used in parallel. The bypass capacitor should be installed as close to the power terminal as possible for best results.

## 9 Layout

### 9.1 Layout Guidelines

When using multiple-input and multiple-channel logic devices inputs must not ever be left floating. In many cases, functions or parts of functions of digital logic devices are unused; for example, when only two inputs of a triple-input AND gate are used or only 3 of the 4 buffer gates are used. Such unused input pins must not be left unconnected because the undefined voltages at the outside connections result in undefined operational states. All unused inputs of digital logic devices must be connected to a logic high or logic low voltage, as defined by the input voltage specifications, to prevent them from floating. The logic level that must be applied to any particular unused input depends on the function of the device. Generally, the inputs are tied to GND or  $V_{CC}$ , whichever makes more sense for the logic function or is more convenient.

## 10 Device and Documentation Support

TI offers an extensive line of development tools. Tools and software to evaluate the performance of the device, generate code, and develop solutions are listed below.

### 10.1 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on [ti.com](http://ti.com). Click on *Subscribe to updates* to register and receive a weekly digest of any product information that has changed. For change details, review the revision history included in any revised document.

### 10.2 Support Resources

[TI E2E™ support forums](#) are an engineer's go-to source for fast, verified answers and design help — straight from the experts. Search existing answers or ask your own question to get the quick design help you need.

Linked content is provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's [Terms of Use](#).

### 10.3 Trademarks

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All trademarks are the property of their respective owners.

### 10.4 Electrostatic Discharge Caution



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

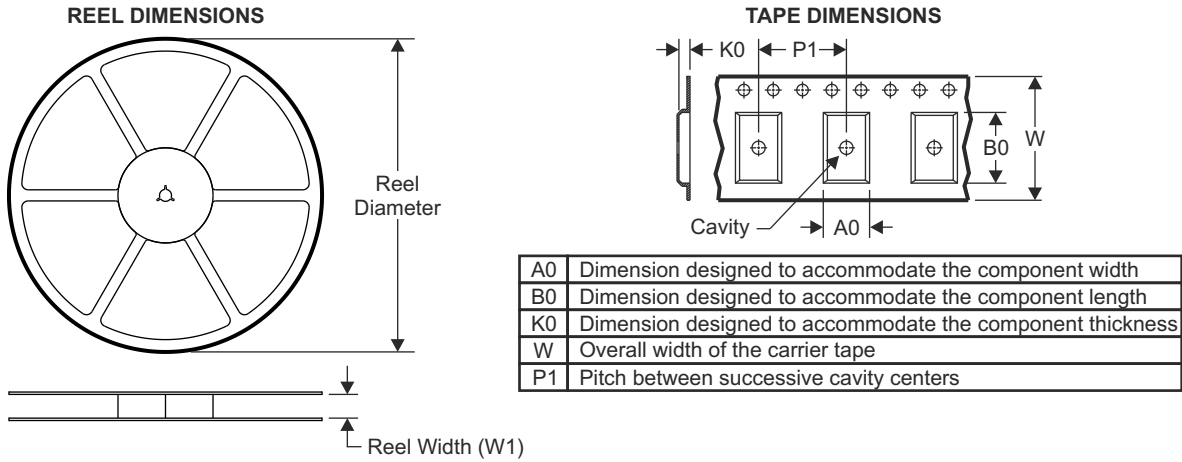
### 10.5 Glossary

[TI Glossary](#) This glossary lists and explains terms, acronyms, and definitions.

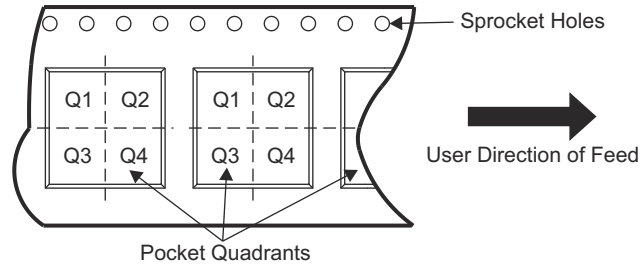
## 11 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

### 11.1 Tape and Reel Information

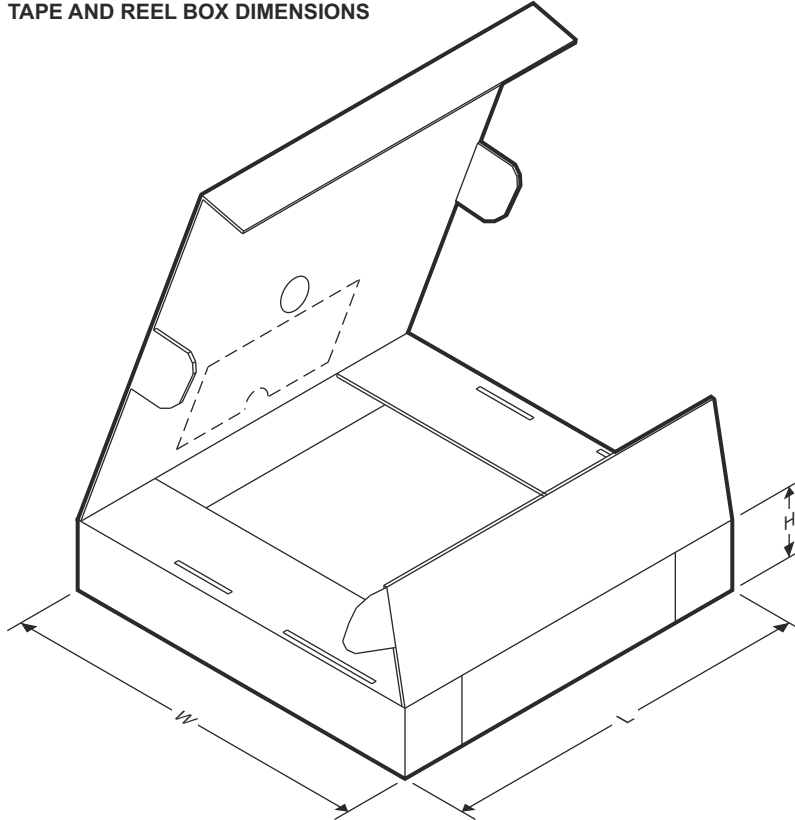


#### QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



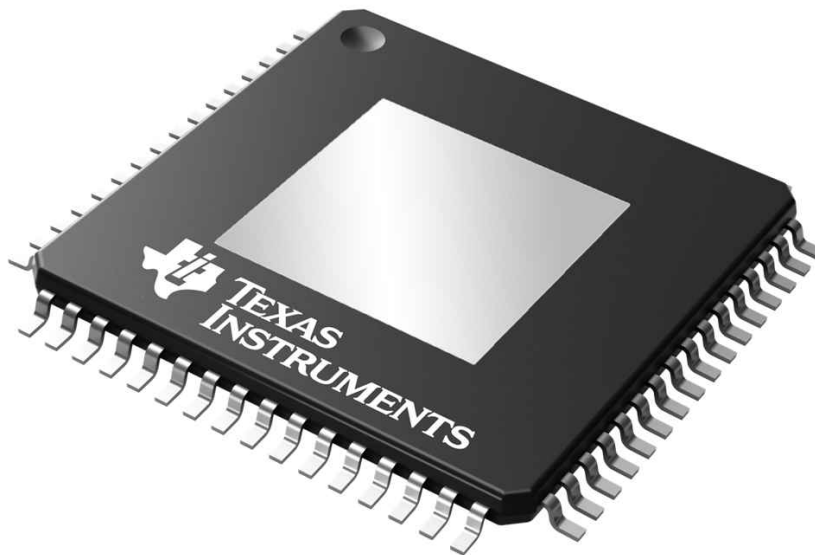
Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
PTAS6584QDKQ1	HTQFP	PHD	64	1000	330.0	24.4	17.0	17.0	1.5	20.0	24.0	Q2

TAPE AND REEL BOX DIMENSIONS



Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
PTAS6584QPHDRQ1	HTQFP	PHD	64	1000	350.0	350.0	43.0

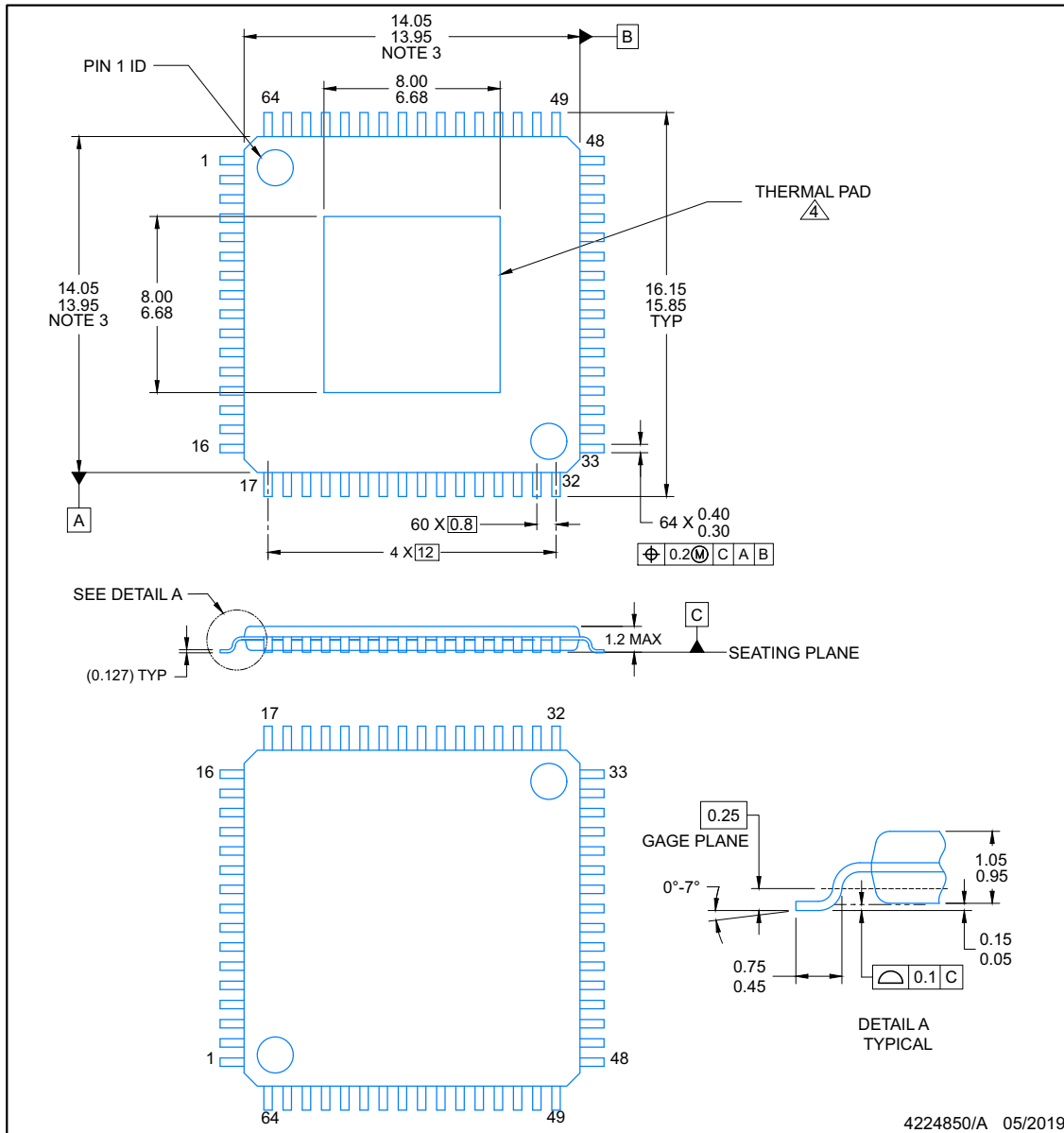
11.2 Mechanical Data



**PACKAGE OUTLINE**  
**HTQFP - 1.2 mm max height**

**PHD0064B**

PLASTIC QUAD FLATPACK



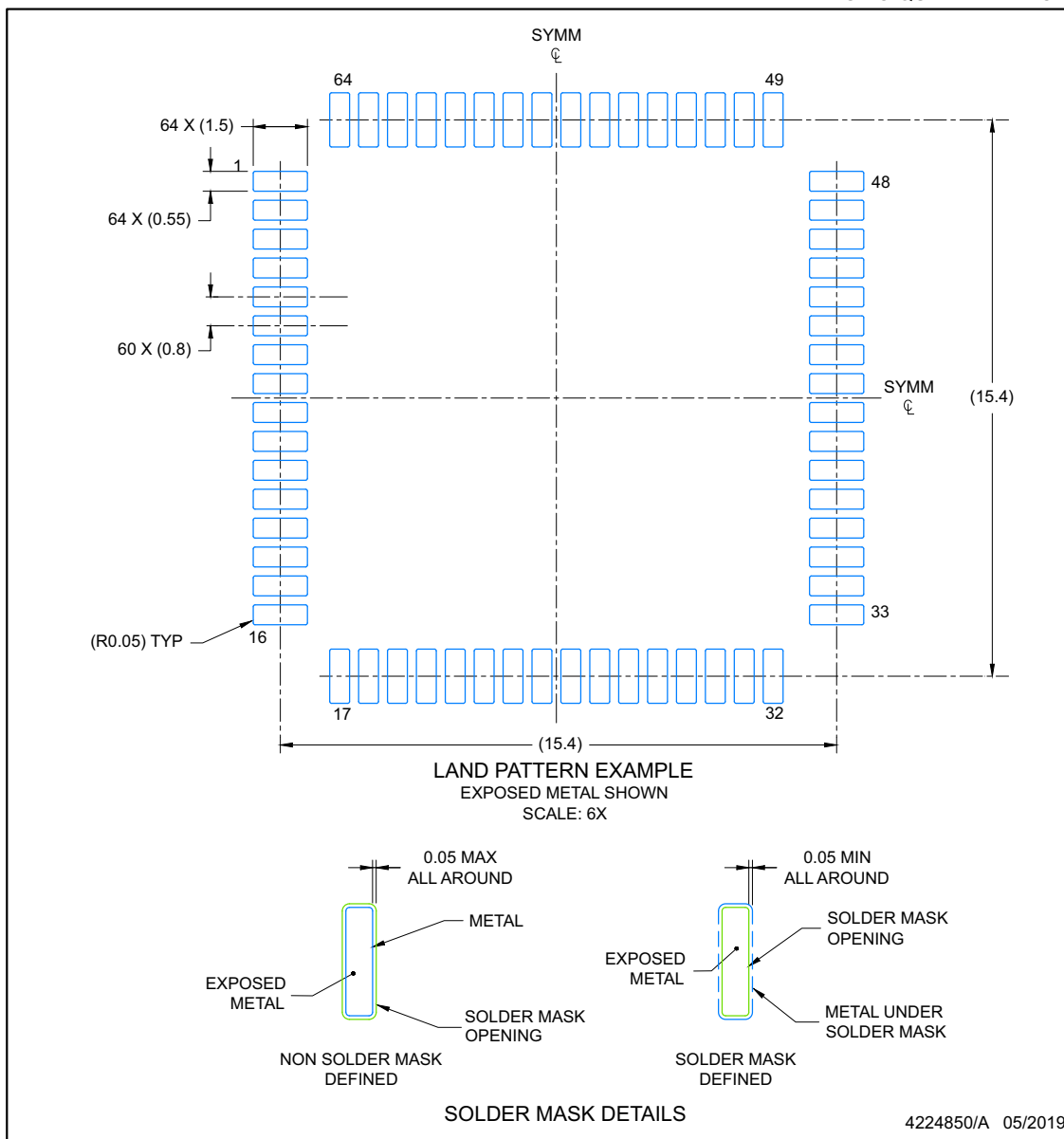
NOTES:

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 per side.
4. See technical brief. PowerPad Thermally Enhanced Package, Texas Instruments Literature No. SLMA002 ([www.ti.com/lit/slma002](http://www.ti.com/lit/slma002)) and SLMA004 ([www.ti.com/lit/slma004](http://www.ti.com/lit/slma004)) for information regarding recommended board layout.

**EXAMPLE BOARD LAYOUT**  
**HTQFP - 1.2 mm max height**

**PHD0064B**

PLASTIC QUAD FLATPACK



NOTES: (continued)

5. Publication IPC-7351 may have alternate designs.
6. Solder mask tolerances between and around signal pads can vary based on board fabrication site.
7. Vias are optional depending on application, refer to device data sheet. It is recommended that vias under paste be filled, plugged or tented.

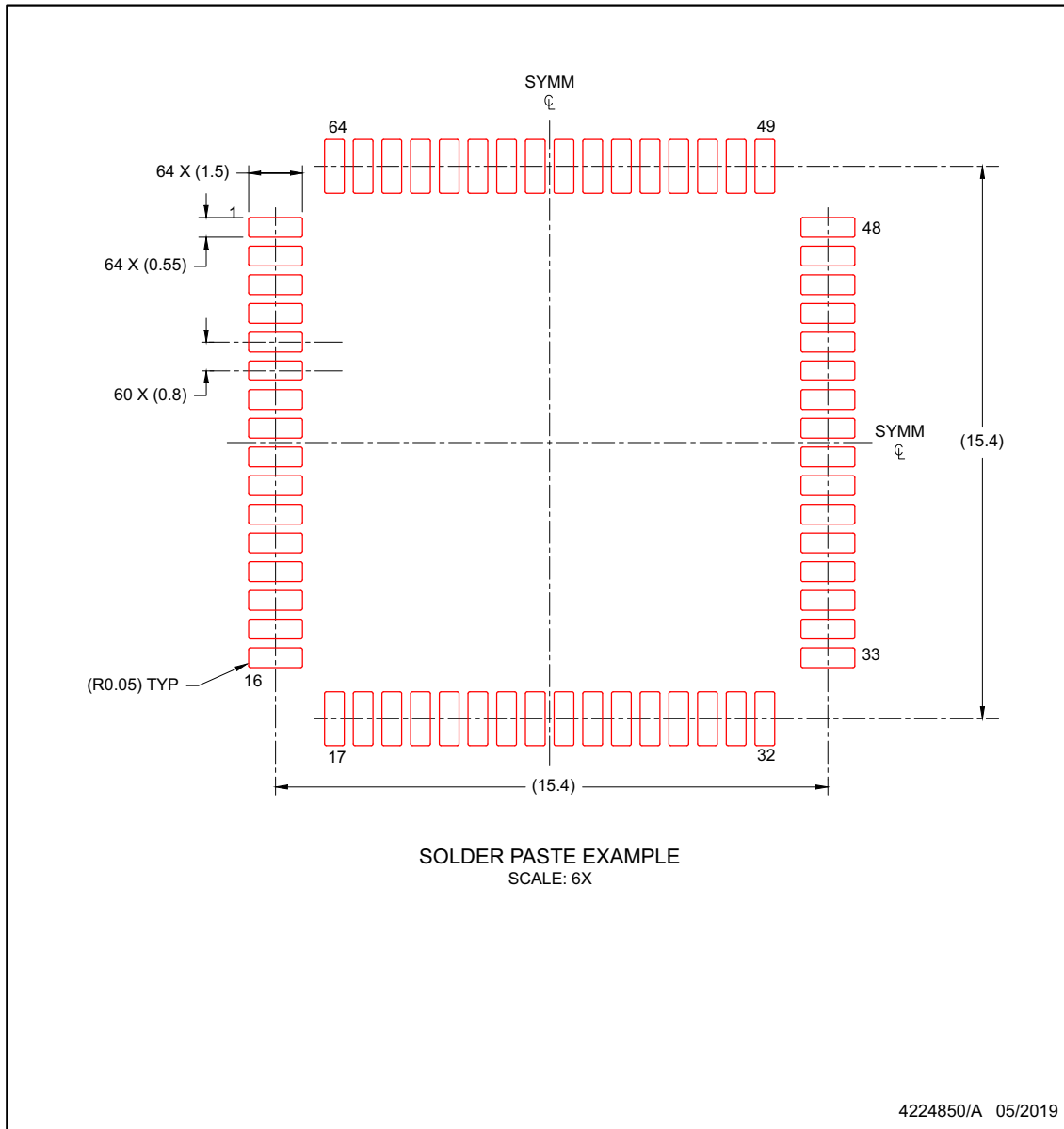


**EXAMPLE STENCIL DESIGN**

**PHD0064B**

**HTQFP - 1.2 mm max height**

PLASTIC QUAD FLATPACK



NOTES: (continued)

7. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
8. Board assembly site may have different recommendations for stencil design.

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
5962-8773301EA	ACTIVE	CDIP	J	16	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-8773301EA CD54HC4511F3A	<a href="#">Samples</a>
CD54HC4511F3A	ACTIVE	CDIP	J	16	1	Non-RoHS & Green	SNPB	N / A for Pkg Type	-55 to 125	5962-8773301EA CD54HC4511F3A	<a href="#">Samples</a>
CD74HC4511E	ACTIVE	PDIP	N	16	25	RoHS & Green	NIPDAU	N / A for Pkg Type	-55 to 125	CD74HC4511E	<a href="#">Samples</a>
CD74HC4511EE4	ACTIVE	PDIP	N	16	25	RoHS & Green	NIPDAU	N / A for Pkg Type	-55 to 125	CD74HC4511E	<a href="#">Samples</a>
CD74HC4511M96	ACTIVE	SOIC	D	16	2500	RoHS & Green	NIPDAU   SN	Level-1-260C-UNLIM	-55 to 125	HC4511M	<a href="#">Samples</a>
CD74HC4511PWR	ACTIVE	TSSOP	PW	16	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HJ4511	<a href="#">Samples</a>
CD74HC4511PWRE4	ACTIVE	TSSOP	PW	16	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HJ4511	<a href="#">Samples</a>
CD74HC4511PWRG4	ACTIVE	TSSOP	PW	16	2000	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HJ4511	<a href="#">Samples</a>
CD74HC4511PWT	LIFEBUY	TSSOP	PW	16	250	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	-55 to 125	HJ4511	
CD74HCT4511E	ACTIVE	PDIP	N	16	25	RoHS & Green	NIPDAU	N / A for Pkg Type	-55 to 125	CD74HCT4511E	<a href="#">Samples</a>

(1) The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBSOLETE:** TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

**RoHS Exempt:** TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

**Green:** TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

<sup>(5)</sup> Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

<sup>(6)</sup> Lead finish/Ball material - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

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**OTHER QUALIFIED VERSIONS OF CD54HC4511, CD74HC4511 :**

- Catalog : [CD74HC4511](#)
- Military : [CD54HC4511](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product
- Military - QML certified for Military and Defense Applications

**TAPE AND REEL INFORMATION**

**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**


\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
CD74HC4511M96	SOIC	D	16	2500	330.0	16.4	6.6	9.3	2.1	8.0	16.0	Q1
CD74HC4511M96	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
CD74HC4511PWR	TSSOP	PW	16	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
CD74HC4511PWT	TSSOP	PW	16	250	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1

**TAPE AND REEL BOX DIMENSIONS**


\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
CD74HC4511M96	SOIC	D	16	2500	366.0	364.0	50.0
CD74HC4511M96	SOIC	D	16	2500	356.0	356.0	35.0
CD74HC4511PWR	TSSOP	PW	16	2000	356.0	356.0	35.0
CD74HC4511PWT	TSSOP	PW	16	250	356.0	356.0	35.0

**TUBE**


\*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
CD74HC4511E	N	PDIP	16	25	506	13.97	11230	4.32
CD74HC4511E	N	PDIP	16	25	506	13.97	11230	4.32
CD74HC4511EE4	N	PDIP	16	25	506	13.97	11230	4.32
CD74HC4511EE4	N	PDIP	16	25	506	13.97	11230	4.32
CD74HCT4511E	N	PDIP	16	25	506	13.97	11230	4.32
CD74HCT4511E	N	PDIP	16	25	506	13.97	11230	4.32

D (R-PDSO-G16)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
  - D. Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
  - E. Reference JEDEC MS-012 variation AC.



4220204/A 02/2017

NOTES:

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm per side.
5. Reference JEDEC registration MO-153.



# EXAMPLE BOARD LAYOUT

PW0016A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE: 10X



SOLDER MASK DETAILS

4220204/A 02/2017

NOTES: (continued)

- 6. Publication IPC-7351 may have alternate designs.
- 7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

# EXAMPLE STENCIL DESIGN

PW0016A

TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE



SOLDER PASTE EXAMPLE  
BASED ON 0.125 mm THICK STENCIL  
SCALE: 10X

4220204/A 02/2017

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

# J (R-GDIP-T\*\*)

14 LEADS SHOWN

# CERAMIC DUAL IN-LINE PACKAGE



DIM \ PINS **	14	16	18	20
A	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC
B MAX	0.785 (19,94)	.840 (21,34)	0.960 (24,38)	1.060 (26,92)
B MIN	—	—	—	—
C MAX	0.300 (7,62)	0.300 (7,62)	0.310 (7,87)	0.300 (7,62)
C MIN	0.245 (6,22)	0.245 (6,22)	0.220 (5,59)	0.245 (6,22)



4040083/F 03/03

- NOTES:
- All linear dimensions are in inches (millimeters).
  - This drawing is subject to change without notice.
  - This package is hermetically sealed with a ceramic lid using glass frit.
  - Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
  - Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.

N (R-PDIP-T\*\*)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
  - The 20 pin end lead shoulder width is a vendor option, either half or full width.

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